

# SPECIFICATION

[Electronic Version 1.2.8]

## [POWERED FLOOR SCRUBBER AND BUFFER]

### Background of Invention

- [0001] Field of the Invention. This invention relates to floor cleaning devices. More specifically, this invention relates to automatic powered floor scrubbing and buffing devices.
- [0002] Description of Related Art. A variety of machines and devices have been developed to clean hard surface floors. Typically, such machines are designed to either clean or polish. Some machines can be selected to do either cleaning or polishing, but generally they do not clean and polish floors simultaneously. Moreover, most such cleaning machines do not provide a plurality of scrubbing pads independent from a single buffing pad and a squeegee positioned between the scrubbing pads and the buffing pad in order to remove water and cleaning fluid prior to the buffing of the floor.
- [0003] Different aspects of floor cleaning machines and components thereof have been disclosed in U.S. Patent Nos. 3,600,735, 3,742,546, 3,795,933, 3,921,244, 3,931,659, 3,952,361, 3,972,088, 4,094,034, 4,096,084, 4,118,819, 4,122,576, 4,150,456, 4,214,337, 4,217,671, 4,237,517, 4,295,243, 4,319,434, 4,322,920, 4,391,548, 4,393,534, 4,407,040, 4,506,405, 4,523,411, 4,577,364, 4,633,541, 4,654,918, 4,783,872, 4,910,824, 5,054,245, 5,127,124, 5,253,384, 5,289,605, 5,371,912, 5,402,559, 5,797,157, and 6,023,813 each of which is hereby incorporated by reference in its entirety for the material disclosed therein.
- [0004] U.S. Patent No. 3,600,735 describes a drive connection for a floor polisher, which permits ready removal from an attachment of brush units to the vertical shaft driven by the motor.
- [0005] U.S. Patent No. 3,742,546 describes a surface treating apparatus having rotatable treating members movable over a surface, a container for liquid wax, which is positioned in a compartment, and has an outlet at its bottom normally closed by a valve having a vertically movable stem.

- [0006] U.S. Patent No. 3,795,933 discloses a multi-purpose cleaning implement includes a base member supporting a sponge mop type work head and an auxiliary implement such as a brush, squeegee, scraper, spreader or similar implement.
- [0007] U.S. Patent No. 3,921,244 discloses a floor buffer for operator directed polishing of a floor.
- [0008] U.S. Patent No. 3,931,659 discloses a floor treating machine supported at the floor or surface to be treated by means of a work disk arranged beneath a substantially ring-shaped stop member, the work disk being detachably coupled with a drive motor.
- [0009] U.S. Patent No. 3,952,361 discloses a floor treating machine having laterally spaced drive wheels driven by separate electric traction motors under electronic control so as to be driven by a separate train of pulses, comprising means for recording the trains of pulses to the traction motors and means for replaying the record to reproduce the trains of pulses whereby the machine will repeat the operation.
- [0010] U.S. Patent No. 3,972,088 discloses an electric floor scrubber and buffer having its scrubber or buffer pad attached to the underside of an oscillating plate.
- [0011] U.S. Patent No. 4,094,034 discloses a floor treating machine of the rotary brush type in which, in operation, the weight of the machine is, to at least a significant extent, supported by the rotary brush or brushes, in which a brush mounting member is flexibly suspended between resilient elements for limited universal movement.
- [0012] U.S. Patent No. 4,096,084 discloses a method for cleaning surfaces such as floors and pavements that includes incorporating a polyelectrolyte in the cleaning solution and a surface-scrubbing machine for carrying out the process.
- [0013] U.S. Patent No. 4,118,819 discloses a floor treating machine of the single rotary brush type having a handle and a motor both laterally offset from the axis of rotation of the brush in a direction to impart a tilting couple opposed to that arising from operator forces counteracting the reaction couple on the handle.
- [0014] U.S. Patent No. 4,122,576 discloses a manually operated floor polishing machine comprising a polishing pad or brush rotatable at a speed above 660 rpm, pressing against the floor with a force of less than about 25 lbs., and positioned so that one segment of the pad presses harder against the floor than the other, such as by mounting the pad's driving plate or disc to that its plane of rotation is at an angle less than about 10° to the plane of the floor.
- [0015] U.S. Patent No. 4,150,456 discloses a floor scrubber with a propane powered internal combustion engine which is mounted on a wheeled dolly and which is attached

by its rotary output shaft to a circular cage provided with a plurality of rotary brushes on the underside thereof.

- [0016] U.S. Patent Nos. 4,214,337 and 4,237,571 disclose compact floor polishers including a base supporting an electric motor having a vertically oriented output shaft and driving a circular brush.
- [0017] U.S. Patent No. 4,217,671 discloses a multipurpose cleaning device which can be used as a bath and tile scrubbing device as well as being adapted for use in conjunction with floors, walls, ceilings and the like.
- [0018] U.S. Patent No. 4,295,243 discloses an apparatus for cleaning, waxing, polishing and otherwise treating the surface of a floor, where the apparatus includes a carriage or frame with a handle for guiding and maneuvering, several containers for dispensing several selected types of fluids or solutions to the floor where a reciprocating scrubber, such as steel wool or a buffing pad operates with a solution to effectively clean, strip, wax or polish the floor surface. In addition, there is a vacuum means, which removes and carries away any excess liquid, solution or dirty cleaning fluids from the floor surface.
- [0019] U.S. Patent No. 4,319,434 describes a surface processing machine that includes at least one motor-driven spider arm assembly, each of the arms of the spider having rotatably mounted as the ends thereof a surface processing tools such as a brush, buffing pad, grinding stone or the like and wherein the surface processing tools are mounted on an axis which is substantially parallel to the axis.
- [0020] U.S. Patent No. 4,322,920 discloses an attachment for use on a rotary floor-conditioning machine comprising a master block, which is integrally molded of a urethane elastomer including a centrally located hub with a circular flange member extending radially from the base thereof.
- [0021] U.S. Patent No. 4,391,548 describes a coupling device adapted for use with floor maintenance machines of the type such as floor brushing, buffing, polishing, scrubbing or the like which enables automatic coupling of the maintenance element without direct manual implementation thereof.
- [0022] U.S. Patent No. 4,393,534 discloses an apparatus for mechanically varying the speed of a disk, such as a floor treating pad, mounted for rotation about the axis of elongation of a shaft powered by a fixed speed motor.
- [0023] U.S. Patent No. 4,407,040 describes a pad drive assembly that detachably grips and rotatably drives a selected maintenance pad by a floor maintenance pad by a floor maintenance machine.

- [0024] U.S. Patent No. 4,506,405 discloses a floor-treating machine adapted to operate as a floor scrubber and a floor polisher or buffer includes a main housing or support frame structure from which extends a brush housing assembly.
- [0025] U.S. Patent No. 4,523,411 describes a rotatable element and a surface-treating device.
- [0026] U.S. Patent No. 4,577,364 discloses a floor-cleaning machine including a support frame with a handle attached to the upper end of the support frame for guiding the machine along the floor and a wheel assembly attached to the lower end. A plurality of disc-shaped floor cleaning pads disposed and held adjacent one another such that a floor pad cylinder having a horizontally disposed and held adjacent one another such that a floor pad cylinder having a horizontally-disposed longitudinal axis is formed are attached to the lower end of the frame.
- [0027] U.S. Patent No. 4,633,541 discloses a floor-treating machine adapted to operate as a floor scrubber and a floor polisher or buffer, which includes a main housing or support frame structure from which extends a brush housing assembly.
- [0028] U.S. Patent No. 4,654,918 describes a buffer deck assembly for floor scrubbing, cleaning and polishing machine that includes a displaceable buffer deck housing mounted to the machine through a substantially U-shaped mounting frame having a pair of sleeves that each slid ably receive a cantilever support arm.
- [0029] U.S. Patent No. 4,783,872 discloses a high-speed floor-treating machine is provided comprising a frame, a control and guiding handle extending rearward of the frame and an electric motor for rotating a floor-contacting pad is secured.
- [0030] U.S. Patent No. 4,910,824 discloses a floor polisher, which causes a pad to rotate at a high speed to polish a floor. The floor polisher has a vertically moving mechanism adapted to move the pad in the vertical direction with respect to the floor, a ground pressure adjusting mechanism adapted to maintain a ground pressure of the pad at a set pressure by controlling the vertically moving mechanism and a floor protecting mechanism adapted to actuate the vertically moving mechanism to lift the pad immediately when the travel of the floor polisher is stopped.
- [0031] U.S. Patent No. 5,054,245 describes a combination of cleaning pads, cleaning pad mounting members and a base member for a rotary cleaning machine.
- [0032] U.S. Patent No. 5,127,124 describes an apparatus for adjusting the height above the floor of a plate to which is attached a pad in a rotary floor machine to accommodate pads having a range of thicknesses.

- [0033] U.S. Patent No. 5,253,384 discloses an electric buffing machine and a method for buffing waxed floors. The buffing machine comprises a molded plastic housing, a foldable handle and a DC drive motor directly driving a buffing pad holder.
- [0034] U.S. Patent No. 5,289,605 discloses a cleaning apparatus in the form of a scrubber that is a motor driven by a direct current (DC) motor driving a rotatable scrubber unit which includes a scrubber disc with the motor and scrubber disc forming a power head supported from a detachable and adjustable length pole which enables surfaces that are normally out of reach to be easily scrubbed.
- [0035] U.S. Patent No. 5,371,912 discloses an electric floor and baseboard-cleaning machine which includes a motor assembly attached to a medium frame in which the movement thereof is adjustable for either straight line or circular motion.
- [0036] U.S. Patent No. 5,402,559 discloses a floor scrubber is provided which consists of a rectangular head assembly.
- [0037] U.S. Patent No. 5,797,157 describes a floor buffer having the power source and drive means mounted at one end of an elongate handle, and a buffer head mounted at the other end, such that the center of gravity of the machine is roughly at the midpoint of the elongate handle.
- [0038] U.S. Patent No. 6,023,813 describes an automatic floor scrubber and buffer that provides for simultaneous scrubbing and buffing of floors through the use of a plurality of pads operating at different speeds to optimize the scrubbing and buffing operation of the device.

## Summary of Invention

- [0039] It is desirable to provide an automatic floor scrubber and buffer machine that simultaneously scrubs and buffs in one pass and vacuums dirty cleaning or waxing solution from the floor prior to buffing.
- [0040] Accordingly, it is an object of this invention to provide a floor scrubber and buffer machine that provides separate scrubbing and buffing heads to thereby permit simultaneous scrubbing and buffing of floor surfaces.
- [0041] A further object of this invention is to provide a floor scrubber and buffer machine that provides a fluid removal device prior to the buffing of the floor.
- [0042] A still further object of this invention is to provide a floor scrubber and buffer machine that employs a large single buffer pad for along with one or more scrubbing pads for the simultaneous scrubbing and buffing of the floor surface.

[0043] Another object of this invention is to provide a floor scrubber and buffer machine that is compatible with a variety of power devices or motors, including electrical, batteries, natural gas, propane, and gasoline engines.

[0044] Additional objects, advantages, and other novel features of this invention will be set forth in part in the description that follows and in part will become apparent to those skilled in the art upon examination of the following or may be learned with the practice of the invention. The objects and advantages of this invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims. Still other objects of the present invention will be readily apparent to those skilled in the art from the following description wherein there is shown and described the preferred embodiment of this invention. As it will be realized, this invention is capable of other different embodiments, and its several details, and specific configurations, are capable of modification in various aspects without departing from the invention. Accordingly, the drawings and descriptions should be regarded as illustrative in nature and not as restrictive.

[0045] To achieve the foregoing and other objectives, and in accordance with the purposes of the present invention, this invention is provided with separate powered scrubbing and buffing pads, separated by a squeegee device for removing fluid from the floor surface prior to buffing.

## Brief Description of Drawings

[0046] The accompanying drawings incorporated in and forming a part of the specification, illustrate a preferred embodiment of the present invention. Some, although not all, alternative embodiments are described in the following description. In the drawings:

[0047] Figure 1 is a perspective view of the preferred embodiment of the invention.

[0048] Figure 2 is a rear view of the preferred embodiment of the invention.

[0049] Figure 3 is a top-down view of the preferred embodiment of the invention.

[0050] Figure 4 is the right side view of the preferred embodiment of the invention.

[0051] Figure 5 is a perspective view of the left side of the preferred embodiment of the invention, with the cover removed to show the motor and frame.

[0052] Figure 6 is a perspective view of the right side of the preferred embodiment of the invention, with the cover removed to show the motor and frame.

[0053] Reference will now be made in detail to the present preferred embodiment of the invention, and example of which is illustrated in the accompanying drawings.

## Detailed Description

[0054] This invention is a machine for simultaneously scrubbing, buffing and removing cleaning and waxing residue from the floor. This invention in its preferred embodiment is equipped with multiple scrubbing pads, a squeegee for removing water, refuse and cleaning fluid, and a buffing pad for simultaneously buffing wax on a floor. This invention is provided with a motor means, both for driving the drive wheels and for powering the scrubbing and buffing pads. In the present preferred embodiment, the motor means is a propane engine, although alternative engines or motor, including gasoline or battery powered electric motor can be substituted without departing from the concept of this invention.

[0055] Figure 1 shows a perspective view of the preferred embodiment of the invention 100 from below. Preferably, a first and second scrubber gear boxes 602, 603 (shown in figure 6) is provided under and near the front 115 of the machine 100. The scrubber gear boxes 602, 603 are typically each provided with a scrubbing pad 102 (a pad is only shown installed in the second scrubber gear box drive 603, although in use both drives would typically have a pad installed). The scrubbing gear boxes 602, 603 are mounted to the frame (shown in figure 5) and are powered by drive belts 116a,b, each of which is mechanically connected to a first clutch 105. Mounted behind the scrubber gear boxes 602, 603 is a squeegee mount 104 and a squeegee blade 103 mounted therein. The preferred squeegee blade 103 is a triple blade squeegee. The preferred squeegee mount 104 includes a vacuum inlet for removing liquid collected by the squeegee blade 103. A set of drive wheels 107a,b are provided for driving the machine 100. A buffer pad 109 is mounted to the buffer gear box 108. The buffer gear box 108 is powered by a belt 117, which is mechanically attached to a second clutch 106. A gear box 108 is provided with a belt drive 507, which in turn is mechanically connected to and drives, providing power to, both the first clutch 105 and the second clutch 106. The gear box 108 is mechanically connected and driven by the gear motor 501 (shown in figure 5). A muffler 110 is attached to the motor 501 exhaust for sound abatement. Two wheels 111a,b are provided for rolling stability. These wheels 111a,b are attached to the rear frame 118. As noted above, the preferred motor for this machine 100, is a propane motor, for this preferred embodiment a propane tank 112 for holding fuel is provided at the rear 119 of the machine 100. A handle 113 and control lever 402 are provided to facilitate user control of the invention 100. A cover 114, which in the present preferred embodiment of the invention 100 is made of plastic or the like is also provided, fitting over the engine, gear boxes, frame and other internal components of this scrubber/buffer machine 100.

[0056] Figure 2 shows a rear view of the preferred embodiment of the invention 100. This view more clearly shows the placement of the propane tank 112 mounted on the rear frame 118 along side of a battery 202. A control panel 301 is provided above and forward of the operator handle 113. The rear stabilizing wheels 111a,b are shown mounted to the rear frame 118. In the present preferred embodiment, a catalytic converter 201 is provided to reduce emissions.

[0057] Figure 3 shows a top-down view of the preferred embodiment of the invention. This view shows the relative locations of the control panel 301 with respect to the user handle 113. The propane tank 112 is shown below the handle 113. The buffer pad 109 is shown below the machine 100. At the top of the cover 114 is provided a fluid bladder tank system 302. The preferred fluid bladder tank system 302 of this invention accommodates clean water, detergent, as well as floor residue vacuumed from the squeegee 104 after the scrub pad drive gear boxes 602, 603. This fluid bladder tank system 302 maintains, to the maximum extent possible, the weight distribution of the scrubber/buffer machine of this invention 100, thereby enhancing the effectiveness of this machine 100.

[0058] Figure 4 shows the right side view of the preferred embodiment of the invention 100. This view particularly shows the relative positioning of the rear support wheel 111b, buffing pad 109, buffing pad cover 506, powered wheel 107a, scrubbing pad 102 and cover, which is driving by the gear belt 116b. The view from the left side of this invention 100, with regard to these components or the other of their pair, 111a, 109, 506, 107b, 101a and 116a, is generally mirrored. The present preferred buffing pad 109 is capable of turning at up to 2500 RPM, while the scrubbing pads 102 are designed to turn at about 200 RPM, although alternative speeds can be selected, in general, without departing from the concept of this invention.

[0059] Figure 5 shows a perspective view of the left side of the preferred embodiment of the invention 100, with the cover 114 removed to show the motor 501 and front frame 505. The engine 501 is preferably positioned directly above the buffer 109. Additional internal component detail of the preferred embodiment of the invention 100 is shown as follows. An exhaust cooling chamber 502 is mechanically connected to the engine 501. The engine 501 is also mechanically coupled to a high CFM vacuum / blower 503, which provides the vacuum pressure for the collection of refuse fluid from the floor. An adjustment 504 is provided to permit the user to adjust the pad pressure. The front frame 505 is shown in some detail. The preferred frame components 505, 118 are made of steel, although it is envisioned that alternative materials can be substituted without departing from the concept of this invention. A pulley 507 is shown having belts 508a, 508b are also shown in additional detail.

[0060] Figure 6 shows a perspective view of the right side of the preferred embodiment of the invention 100, with the cover 114 removed to show the motor



501 and frame 505. This view shows the components of figure 5, from the other side. Also, shown in this figure 6, is the preferred location of the alternator 601, attached to the engine 501 and electrically in communication with the battery 202. The dedicated gear boxes 602, 603 attached respectively for each scrubber.

[0061] The previous described preferred embodiment of the invention is to be considered in all respects only as illustrative and not as restrictive. Although the embodiment shown and described herein has particular components in particular connection configurations, the invention is not limited thereto. The scope of this invention is indicated by the appended claims rather than by the foregoing description. All systems and devices, which come directly within the claims or within the meaning and range of equivalency of the claims, are to be embraced as being within the scope of protection of this invention.

Fig. 1 is a perspective view of the engine 501 and frame 505 from the front side. Fig. 2 is a perspective view of the engine 501 and frame 505 from the side. Fig. 3 is a perspective view of the engine 501 and frame 505 from the top. Fig. 4 is a perspective view of the engine 501 and frame 505 from the bottom. Fig. 5 is a perspective view of the engine 501 and frame 505 from the rear side. Fig. 6 is a perspective view of the engine 501 and frame 505 from the front side, showing the alternator 601, gear boxes 602, 603, and battery 202.